

Discussant Comments

“Do Corporate Taxes Hinder Innovation?”
by Mukherjee, Singh and Zaldokas

by

Mark Schankerman
London School of Economics

CEPR Conference on Entrepreneurial Finance,
Innovation and Growth
October 2014

Research question: What is the impact of state corporate income taxes on innovation, as measured by patents and R&D?

Examine (staggered) tax rises and cuts across states and relate them to firm/year variations in innovation, where tax exposure determined by location of corporate headquarters. Mostly treat tax changes as exogenous, but also use electoral outcome information as IV.

Find strong effects for tax rises, weak/no effect for tax cuts. Stronger for patents than RD.

Theory

- ❑ No analytical framework to aid interpretation. How should corporate tax (CT) affect investment?
- ❑ CT affect both marginal return and marginal cost:

$$(1-\tau) \text{MPR} = (1-\tau) (1-\lambda) p(r+\delta-\Delta p/p)$$

If RD expensed/no RD tax credit, CT has no effect. More generally, the effect of CT depends on tax provisions which may affect firms in different ways.

- ❑ Existing estimates suggest R&D demand elasticity = -1. Translate the empirical estimates into implied elasticity as a “reasonableness check”.

Theory/Measurement

Tax rates

- ❑ What tax rate is conceptually appropriate? Does it depend on whether the tax effect is due to
 - 1) cash constraints in financing innovation (short run, inter-temporal substitution)
 - 2) demand side profitability calculations (long run)
 - 3) Decision to patent out of stock vs invest new flow

- ❑ statutory vs effective tax rate
 - Does a change in max rate affect any/all firms? Can authors compute impact on each firm using simulated tax rates? How are state-level R&D tax credits incorporated?

Measurement

□ Tax changes viewed as transitory or permanent?

Effect on investment and patenting decision depend on the expected path of tax rates. Estimate dynamics of tax changes for “long run” value. One needs time structure of costs and revenues to construct appropriate measure.

(could differ across industries – pharma vs software)

Critical to how we expect tax changes to impact behaviour, especially innovation investment as opposed to short run patenting. Some investment modelling with patent selection element would help.

Measurement

Patenting

- ❑ Dependent variable = total firm patents (observation unit = firm/year), and only tax changes in location of corporate headquarters. Why not use firm/state/year as observation unit?

- ❑ Depends on how is liability for corporate taxes actually distributed under the law? Consolidated accounts in some/all states?
 - E.g., state tax credits apply are based on location of the relevant R&D. Bloom, Schankerman & van Reenen (ECM, 2013) use inventor location to construct firm-level credits. Does this apply also to state corporate income tax?

- Magnitude of tax effect looks plausible. Authors estimate 1.5 point increase in tax (=22% change) increases patents by 3.3%, so elasticity = 0.15. Mean state tax 6.8%, federal 29%, so implied % change in **overall** tax rate is 5.5%. Implies tax elasticity of 0.6, which seems in line with estimates of R&D demand elasticity (≈ 1). More?
- But timing is problematic. Impact of tax increase felt only in $t=2$, very quick for patents (qua innovation). Why does it immediately dissipate? Adjustment costs dictate *smoothing investment*.
 - ❖ Is there a fast impact on patenting decision on existing stock of innovations and slower impact on flow of new innovations?
 - ❖ Crucial to pin down the timing of the effect, not currently done. This is the key to interpreting the impact as on patenting decision or innovation investment decision.

□ More on timing and dynamics: Permanence is key

- ❖ It all depends on whether tax rates (changes) are permanent or transitory. If a tax change is transitory, estimates imply a permanent and immediate change in level of innovation. If expected to be reversed, then a one time change in level. All this needs to be examined carefully.
- ❖ Empirically, for tax changes (eventually) reversed, impact on growth rate of patenting/RD is all in year 2 and twice as large as effect for tax changes not reversed. Indicates importance of perceived permanence of tax changes, but puzzling why transitory changes have bigger impact – suggests impact on patenting propensity/timing.

□ Using R&D/Assets or $\ln(1+R\&D)$ yields more symmetric effect, but still immediate and fully dissipated in one year. Very puzzling. Implied R&D demand elasticity is far smaller than other estimates.

□ **Asymmetry of impacts problematic**

No effect for tax cuts, strong effect for tax rises. Hard to explain theoretically. Unless there is asymmetry in dynamics of tax changes.

□ Using R&D/Assets or $\ln(1+R\&D)$ yields more symmetric effect for tax cuts and increases. But still the effects are immediate and fully dissipated in one year. Very puzzling. And the implied R&D demand elasticity is far smaller than other estimates.

More on Unbundling the Tax Impact

- Heterogeneity of impact across firms within a sector?
 - Estimate MTE [Galasso, Schankerman & Serrano (RAND, 2013) or Galasso & Schankerman (QJE, 2015)]

- Does the average tax impact vary across sectors (e.g., by patent reliance, which might suggest patenting, not innovation)?

- Small vs large firms (measure of cash constraints)
 - ❖ Across firm: tax impact larger for small firms (though Compustat data, so no very small ones)
 - ❖ Over time: tax larger when cash constraints are more severe?

- ❑ IV requires political outcomes to be independent of unobserved (current/recent) state shocks affecting tax changes (unobserved state demand/cost conditions). Not entirely convincing.
- ❑ Don't understand the hypothesis that firms with higher simulated marginal tax rates should react more strongly. Depends on **form** of the tax changes -- i.e. is it to max or infra-marginal rates?
- ❑ Nice placebo test about taxes that should not matter (e.g. personal income) in fact do not.
- ❑ Small point: Median # patents =0. Work with count model and/or add dummy for patent=0 observations. Also try limiting to firms with patents>0.

In summary:

- ❑ Important question, careful attention to identification, though issues remain.
- ❑ Results interesting, but the timing asymmetry of tax effects (increases matter, cuts do not) remain puzzling. Serious question about whether impact is innovation or selection into patenting. Welfare implications are completely different. Need a two-equation setup to address this, and a model to help us understand more clearly.
- ❑ Short vs long run impact: Is the measured effect inter-temporal substitution or long run? Need more attention to dynamics of tax changes and an investment model to help sort this out.